DOCUMENT RESUME

ED 224 877 CE 074 426

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TITLE Training in the Petroleum Industry: An Analysis of Its Organization and Programs.
INSTITUTION Petroleum Industry Training Service, Calgary (Alberta).
PUB DATE Apr 82
NOTE 104p.
AVAILABLE FROM Petroleum Industry Training Service, 2115 27 Avenue NE, Calgary, Alberta, Canada ($5.00).
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS Employment Opportunities; *Employment Projections; *Foreign Countries; Industrial Education; *Job Training; Labor Force Development; *Labor Needs; Management Development; Occupational Surveys; *Petroleum Industry; Trade and Industrial Education; Vocational Education
IDENTIFIERS *Canada

ABSTRACT

Exploratory, descriptive research was conducted to identify potential and existing shortages of skilled manpower in the petroleum industry. Data came from interviews with 60 individual companies, governments, industry groups, and professional associations. Company characteristics that were significant determinants of training were size, foreign or Canadian ownership, age, and business activities. The tendency to move employees from technical to managerial roles was noted as having a serious negative effect on companies. Company training programs varied tremendously in terms of size, complexity, and function. The difficulty of achieving cooperation in training was noted. Industrial training in the petroleum industry was found to be divided into three major categories- pre-employment education and training, initial industrial training, and performance maintenance and improvement. Innovations in training were also identified. These general program areas where future demands might be concentrated were identified: technical professionals, trades/operations personnel, and supervisory/managerial development. Recommendations were made to individual companies and to the industry in general that should support cooperative efforts to meet training needs common to significant segments of the industry. (Data collection forms are appended.) (YLB)

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TRAINING IN THE PETROLEUM INDUSTRY:
AN ANALYSIS OF ITS ORGANIZATION AND PROGRAMS

William H. Taylor, Ph.D.

April, 1982

The Petroleum Industry Training Service
Calgary, Alberta.

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PREFACE

The Petroleum Industry Training Service commissioned this study, in an effort to identify potential, and existing, shortages of skilled manpower in the petroleum industry. With the knowledge gained through this study we, and the industry, will be better able to launch an orderly assault on the problem of how to provide the needed skills - primarily through effective training.

Unfortunately, there is a danger, in reading this study, of forgetting that its express purpose is to identify the training that is not being done. Consequently, its emphasis is on the short-comings, and this can create the false impression that little training is done in the petroleum industry. Nothing could be further from the truth. The very existence of the Petroleum Industry Training Service indicates the industry's concern for and commitment to training.

The Petroleum Industry Training Service was set up, in 1949, as a result of the direct efforts of the several companies involved in the petroleum industry. They were deeply concerned about the need to train people to work safely and effectively in this complex, rather technical, "new" industry. Since then the Petroleum Industry Training Service has continued to broaden its role in helping to meet the training needs of its industry - to the point where, although it conducts only a small portion of the training done in the industry, it now has over 6000 people a year attending a growing selection of upgrading courses.

In January, 1980, the Board of Directors of the Petroleum Industry Training Service reviewed the organization's role in training, and initiated a drive to broaden that role even further. Their goal was to have the Service become the manpower planning arm of the industry, working to help identify potential gaps in training as well as to provide programs to fill those gaps. This study is a direct result of that decision to have the Service take a more strategic role in training.

Allan H. Anderson
Executive Director
Petroleum Industry Training Service

Foreword

This study was begun in the Spring of 1981 with the primary objective of assessing the impact of projected manpower shortages on training requirements of the petroleum industry. Since the beginning of the study, the economic climate in the industry has taken a dramatic downturn resulting in the training budgets of many companies being severely slashed. Consequently, the number of in-house training activities has been reduced and attendance at external training programs has been restricted. Optimistic observers of the industry see the current situation as a temporary setback in the long term growth of the industry. If this view is accepted, then shortages of skilled manpower will still occur (although at a point further off in the future) and the requirements for increased training will be realized.

The study was sponsored by the Petroleum Industry Training Service and conducted by the author while on leave from the University of Calgary. The author wishes to express his sincere thanks for the excellent support provided by the Petroleum Industry Training Service, particularly Mr. Wayne Wetmore who ensured the study stayed on track and made many helpful suggestions.

I SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A Summary

The initial phase of this study was the examination of industry and government projections of the manpower requirements of the petroleum industry. Most groups making such projections acknowledged the difficulties of projecting because of poor data and uncertain economic and political environments. Consequently, although there was agreement that the demand for technically skilled manpower will exceed the supply over the foreseeable future, the projections were generally not able to identify the precise nature of the demand nor its magnitude.

Following this analysis of manpower projections a survey of selected companies in the exploration/production section of the industry was conducted. During the survey some sixty individuals were interviewed in twenty-four companies. Information was collected regarding the programs offered by companies, the staff employed in training functions, the external resources used by the companies, the perceived effectiveness of various training methods, and the anticipated future training requirements of both the individual companies and the petroleum industry in general. In addition to data collected through interviews, firms were requested to provide statistics describing both current and projected training programs.

The information collected was analyzed and is presented in the body of this report. Conclusions shown from the data are presented below.

B. Conclusions

The nature of the study did not allow the formulation of

conclusions based on the analysis of masses of statistical data. Rather, the author attempted to gain insights into the current and future states of training in the petroleum industry by interviewing those directly involved in the training process. The following conclusions are, therefore, very much the synthesis of a great many informed opinions supported wherever possible by hard data provided by the companies surveyed.

The conclusions will not be uniformly applicable to the whole of the population for at least two reasons. In the first place, the companies included in the sample may not be completely representative of the exploration and production sector of the industry. (The companies contacted are listed in Appendix A). In the second place, there were invariably exceptions to every conclusion reached. The fact that such exceptions exist should not, however, negate the general validity of the conclusions.

One final qualifier to the conclusions is that although they are largely negative in tone, this does not imply that no effective training programs were present in the companies surveyed. On the contrary, the industry has put enormous energy into the development of training and in many areas can be cited as models for industrial training. The intensive training provided for recent engineering and geology graduates by the multi-national firms is just one example. It was reasoned, however, that the value of a report of this type is not in applauding obvious progress in the field but in identifying areas where improvements are possible. This may lead individual companies to reconsider their approaches to the provision of training and may encourage the industry in general to examine options for industry-wide co-operation in the training field.

The conclusions below are divided into groups roughly similar to the body of the report so that the reader may refer to the more extensive discussion of data and rationale.

1. The Manpower Situation

   The technical nature of the industry dictates a dependence on a continuing supply of highly skilled and highly qualified personnel. In the future, shortages of these personnel could increase to critical proportions.

2. Organization for Training

   a. In-house training organizations had concentrated on program administration with little emphasis on needs identification, program development, evaluation, and policy development.

   b. The lack of effective information systems had hindered companies' capacities to monitor training activities, effectively allocate resources, or develop manpower development policies.

   c. Although training staffs had been increased recently, there was an apparent lack of personnel with education and experience in industrial training.

   d. In-house training organizations were often fragmented with minimal co-ordination of technical training. In addition, there appeared to be little integration of technical and non-technical training.

e. Only limited efforts have been made to promote industry-wide co-operation in training.

f. There was little apparent co-operation among industry, governments, and educational institutions in the development, administration or funding of training programs.

3. Training Programs

a. The industry has had little direct or indirect involvement in pre-employment education/training.

b. Although current and projected manpower shortages were acknowledged to be most severe in the category of technical professionals (e.g. engineers, geologists, etc.) the initial training period for these personnel currently takes place over an extended two to three year period.

c. Although on-the-job training (OJT) was considered the most effective method of technical training, OJT took place on a haphazard basis with little assistance or training provided to supervisor-trainers.

d. The lack of technical/professional staff with five to ten years experience has made OJT difficult and probably less effective than in the past.

e. There is an apparent lack of instructional aids (e.g. workbooks, models, videotapes) which could be used for in-house technical training.

f. The industry has not made any extensive use of advanced training technology such as computers, videodiscs, or teleconferencing even though there are many recognized appropriate applications of such technology, particularly in technical training.

4. General Conclusions

a. The in-house training capacities of exploration/production companies is greatest in the large multinationals, has only recently been expanded in Canadian majors, and is almost non-existent in smaller firms.

b. The industry-wide training capability has been restricted by an apparent reluctance to co-operate either through new or existing mechanisms in the development of programs to meet common training requirements.

C. Recommendations

The following recommendations have been divided into two groups depending upon whether they are directed at individual companies or to the industry generally. To reiterate a point made previously -- these recommendations are not intended to apply to all individual companies since in many cases the firms had already instituted the suggestions being made in this report.

1. It is recommended that individual companies

a. review their current in-house training organizations with the objective of improving their capability to:

- identify training needs,
- develop effective training programs,
- develop methodology to evaluate the effectiveness of programs, and
- formulate training policies which will contribute to the overall business strategy of the company.

b. give priority to the development of information systems that will assist in the effective management of the training function.

c. improve the co-ordination or integration of the various training efforts within individual companies through structural changes in their training organizations.

d. investigate arrangements with government, professional associations, and/or educational institutions that could assist in the development, accreditation, and funding of training programs.

e. redesign initial training programs for technical professionals to incorporate a more structured, integrated approach in order to minimize the initial training period.

f. make on-the-job training more effective through the:

- explicit statement of competencies to be gained,

- development of instructional aids, and

- training of supervisors in the techniques of OJT.

2. Industry in general

It is recommended that the petroleum industry support co-operative efforts to meet training needs which are common to significant segments of the industry. Such efforts could be conducted through existing mechanisms such as P.I.T.S. or through arrangements made to develop and administer specific programs. Training needs which could be addressed through joint effort include:

- pre-employment training in areas of critical shortage

- initial training programs for newly graduated technical professionals (such programs to be used primarily by smaller companies who cannot justify in-house programs)

- programs utilizing advanced training technology which may be too costly for companies to undertake individually

- development of instructional materials which could be used for in-house training programs

- improving the instructional skills of in-house trainers and supervisors.

II THE CONTEXT OF THE STUDY

Within this section several characteristics of the industry which have an impact on training will be examined and the present and projected manpower situation will be explored. This information provides the general background against which the training scene may be viewed.

A. The Nature of the Industry

During the past decade the petroleum industry in Canada has experienced tremendous growth. Expanded exploration activities and a rash of new companies, mergers, and takeovers has changed the face of the industry and created an unprecedented demand for personnel, particularly in the new corporate offices located in Calgary. (for example, Husky increased its staff from 600 to about 1,300 in a space of only two years). An industry which historically has been dominated by foreign-owned companies developed a sizable Canadian component and even the multi-nationals established Canadian subsidiaries with greater autonomy respecting human resource management.

Unlike industries such as manufacturing or public service which are labour intensive, the petroleum industry is predominately capital intensive. Huge investments in high technology capital equipment can be operated by very few highly skilled personnel. Consequently, the industry can invest heavily in the recruitment, compensation, and development of human resources without drastically increasing the cost of doing business. This ability has been manifest in major recruitment efforts, rapidly escalating salaries, and recent investments in training programs.

This expansion resulted in an interesting distribution of exploration/development companies according to size. Table

Table 1
Distribution of
Oil and Gas Producers, Explorers and Developers
by size of Company

Number of Employees	Number of Companies	% of Total
Less than 25	671	86.4
25 - 100	49	6.3
101 - 200	13	1.7
201 - 300	7	.9
301 - 400	0	.0
401 - 500	1	.1
501 - 600	5	.6
601 - 700	1	.1
701 - 800	0	0
801 - 900	0	0
901 - 1000	1	.1
1001 - 1500	3	.4
1501 - 2000	4	.5
Greater than 2000	11	1.4
No Figures	11	1.4
TOTAL:	777	99.9

Source: Canadian Oil Register, 1981 - 82

1 indicates that of the 777 companies in the production, exploration, and development sector 671 or 86.4% have fewer than twenty-five employees. Nevertheless, those large companies at the other end of the scale dominate the industry in terms of demand for skilled manpower.

Another characteristic of the industry is its reliance on high technology. The processes of locating and exploiting oil and gas reserves require personnel with highly developed technical skills, many of which are unique to this industry. A technical background has become a pre-requisite to advancement in management ranks and has, perhaps, contributed to another characteristic of the industry which is a de-emphasis of the human resources or "soft side" of management.

The industry, particularly in the small-to-medium sized companies, has adopted a free-wheeling, entrepreneurial style of management which emphasizes the financial and operations components of the organization.

However, as a firm grows and as the manpower supply/demand situation becomes tighter, Human Resource Management (HRM) becomes more critical. Specialized HRM functions are established at some point in a company's growth, possibly in the following sequence:

- Recruitment. Internal recruitment staff become responsible for adding or replacing staff.

- Compensation Administration. Wages, salaries and benefits are usually administered through a central organization unit.

- Labour Relations. A unionized labour force necessitates establishment of a section to deal with

negotiations and contract administration. Since few petroleum companies are unionized, this is usually not a well developed function.

- Employee Development. A specialized training function is often among the last of the HR components to be developed. In most small to medium sized companies in the petroleum industry this component is either non-existent or is a part-time responsibility of someone responsible for recruitment. The findings of the study (which will be presented in greater detail later in the report) indicate that employee development organizations in the petroleum industry are usually quite narrow in scope, focussing primarily on administering programs developed by external consultants. There is evidence, however, that employee development is expanding through the recruitment of in-house training staff.

- Human Resources Planning (HRP). In this technology - oriented industry most of the planning for future development has been concerned with the technical and financial feasibility of potential projects. Only recently, according to several interviewees, have companies begun to undertake manpower planning early in the development of business plans. HRP in the petroleum industry is particularly difficult because of political and economic uncertainties. Nevertheless, attempts are being made within companies and across the industry (through the Canadian Petroleum Association) to project future manpower requirements and to convey these requirements to government, educational institutions, and their internal training staff.

B. The Manpower Situation

Major government and industry reports have forecast severe shortages of "highly skilled" (tradesmen) and "highly

qualified" (university graduates) manpower in Canadian industry in general and in the petroleum sector specificially. These studies acknowledge the difficulties of projecting requirements for specific industries due to the lack of reliable data.

Recently published federal government reports ("Work for Tomorrow: Employment Opportunities for the 80's" and "Labour Market Development in the 80's") reached somewhat similar conclusions. They both found it striking that an imbalance has developed where critical shortages of certain skills are coincident with high levels of unemployment. Several reasons for this situation were suggested. Much of the blame was laid on lack of on-the-job industrial training, poorly organized apprenticeship programs, and government programs that train for non-existent jobs. In addition, educational institutations were criticized for not providing sufficient student places in programs such as engineering, geology, and computer science.

The report by the "Major Projects Task Force, Manpower Subcommittee", sponsored by industry and labour reached conclusions similar to the government studies. They concluded there will be severe shortages of skilled manpower, particularly if major energy projects proceed concurrently. The report specifically noted the lack of data required to accurately "delineate the precise dimensions of the problem".

One effect of these manpower shortages has been increased efforts by petroleum companies to recruit personnel. Intensified recruitment efforts for highly qualified personnel have been made overseas as well as domestically. The Major Projects Task Force, however, suggests that "Canada's traditional reliance on the inflow of foreign workers to provide our skilled manpower is no longer viable. Rather, we must expand our training efforts to meet our needs from within Canada as much as possible" (P. 31).

Based on the reports mentioned above, Canada's Minister of Employment and Immigration on January 4, 1982 presented a paper titled "Federal Occupational Skill Development Policy for the 1980's: A National Program" to a Federal Provincial conference on training. The federal minister proposed major changes to the system of industrial training. The principle recommendations were to:

- refocus training efforts on critical occupations,
- develop improved systems for human resource planning,
- provide increased assistance to the private sector for industrial training,
- redirect institutional skill training, and
- provide significant federal funding for capital and start-up costs for training in areas of serious skill shortages.

These recommended policy changes by the federal government were directed toward Canadian industry in general but could have significant impact directly on the petroleum industry. In light of these recommendations, the industry should be prepared to assess its current training programs and to modify its approach as the new manpower situation may dictate. This study may form the basis for such an assessment by providing a general overview of the current state of training programs and organizations.

III ORGANIZATION OF THE STUDY

The study was designed as exploratory or descriptive research as opposed to theoretical or experimental research. No hypotheses were stated or tested and no elaborate data collection instruments were devised. Nevertheless, the study was guided by a particular view or model of the industry. This model incorporated what were considered to be the primary factors influencing which training programs were to be offered, in what manner, and for whom. The model is briefly presented below, followed by a description of the sources of data.

A. Determinants of Training

Figure 1 shows the relationships among four factors which are the major determinants of training. The characteristics of a specific company, including its size, age, ownership, and principal business activities, is the first factor. These company characteristics determine to a large degree the types of employees hired by the company. The types of employees will obviously be the principal determinant of which training activities will be conducted. The final factor, the organization for training, refers to the manner in which training is organized within the company. For example, who has responsibility for training, what are their qualifications, and what is the reporting structure of the training staff? The model suggests that the organization for training both determines and is determined by the training activities of the firm. This organization for training is also dependent upon certain characteristics of the company. If a company is a subsidiary of a multi-national corporation it may well adopt an organization similar to that of the parent firm. Alternatively, a young Canadian owned company will have to search for a model and may develop a very different structure.

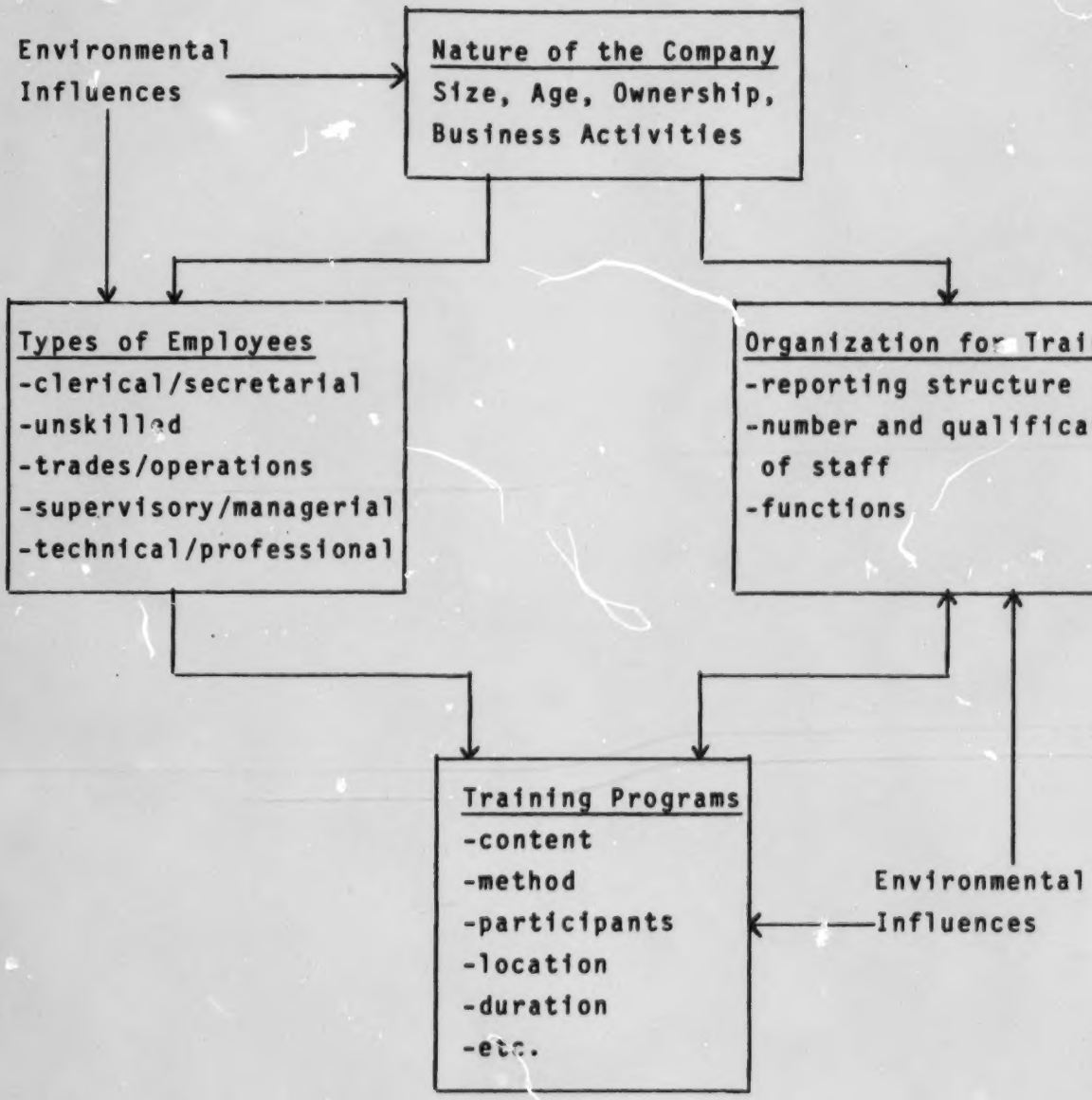

FIGURE 1
DETERMINANTS OF TRAINING:
A CONCEPTUAL MODEL

A description of the model would not be complete without mention of the environmental influences. The four major factors do not exist in a vacuum but rather are subject to an array of influences, many of which the company cannot control. For example, the types of employees is a function of not only the requirements of the company but also of the supply of manpower available in the community. If the ideal employees are not available, lesser qualified personnel will be recruited and a new set of demands will be placed on the training system. Similarly, the training activities which the company undertakes may be influenced by the training programs available in the environment, whether or not these external programs meet the precise needs of the company.

Furthermore, the organization for training may be influenced as much by one individual training manager recruited from the environment as by either the company's characteristics or the training activities of the company.

This conceptual model was developed to guide the collection and analysis of data, however, due to the open nature of the system being described (i.e. the many influences of the environment on the training system) the data collection process was not confined to the four major factors identified in the model but was left open-ended so that external information could also be incorporated.

B. Sources of Data

The major sources of data were interviews with some 60 individuals employed in 24 companies (Appendix A), statistics on training activities provided by those companies, and reports produced by individual companies, governments, industry groups, and professional associations.

A review of recently completed manpower studies provided the researcher with background material on the human resources situation in the petroleum industry. Following this review a draft of the interview guide was developed and administered on a pilot basis in the Hudson's Bay Oil and Gas company. Revisions were made to the guide and other data collection forms (Appendix B). After the review of the size distribution of companies (Table 1) it was decided to concentrate on collecting data from the larger firms.

Contacts were made through the Human Resources departments and interviews arranged with those reputed to be most knowledgeable about training requirements within the companies. Firms were selected in each size category (both foreign and Canadian owned) in an attempt to ensure the sample was somewhat representative of the exploration/development side of the industry. The names of firms and interviewees are contained in Appendix A.

Another factor influencing the selection of firms was their reputation for innovation in training. It was considered important to be aware of the "state-of-the-art" activities occurring within individual companies.

In summary, when designing the study it was decided the best sources of data concerning the future training requirements of the industry were the informed individuals within the industry. These data were then analyzed and interpreted in light of projected manpower requirements and judgements made as to the capacity of the industry to respond to future training demands.

The following sections follow the organization of the model and present data collected during the study.

IV CHARACTERISTICS OF THE COMPANIES

The following characteristics of individual companies and the industry in general were considered to be significant determinants of training.

A. Size

There was a high correlation between the size of the company and the efforts made in training. A firm apparently must reach some critical size before a specialized training unit will be set up or full time co-ordinators appointed in line departments. Before reaching that critical size the company elects to "buy" rather than "make". A well known characteristic of small firms is their tendency to recruit experienced personnel who have received training with one of the "majors". Those interviewed in the large multi-national companies frequently observed that they trained for the entire industry although they (the multi-nationals) paid the entire cost.

Managers in the smaller companies pointed out the difficulty of training employees who come to them with no skills or experience. Because they have such small numbers of each type of employee it is impossible to organize on-the-job training and the programs are not available from external sources. Consequently, they are forced to recruit more senior professionals and technicians who have received their training elsewhere.

B. Ownership

The main distinction in ownership is between foreign and Canadian companies. Most larger foreign-owned companies have training centres, usually located in the United States, to

which they can send employees or from which they can borrow programs and instructors. These parent companies usually have established patterns and traditions of training which become part of the management or operating style of the Canadian subsidiary.

On the other hand, Canadian companies have either not reached a size where training is considered feasible or if they have become "majors" have not yet developed a large internal training capacity. In the past year, however, both Dome and Nova have taken steps to significantly expand their training activities - Nova through the establishment of a Technical Training Centre and Dome through the recruitment of training staff and major expenditures on program development.

The multi-national firms were also having to bolster their local training capacity as they discovered the training facilities of their parent companies are becoming overcrowded or the cost of sending people was becoming prohibitive.

In the long run, the distinction between foreign and Canadian ownership may become an insignificant factor in determining approaches to training but in the past and in the short run it appears to be a major factor.

C. Age

The age of companies is closely linked to ownership since Canadian firms tend to be newly formed or at least just recently expanded. Therefore, it is difficult to identify the causal relationships among size, ownership, age and development of training. Nevertheless, it was apparent during the study that organizations must reach a level of maturity before training becomes a high priority activity. In the early stages of development, priority is given to the primary function of

the company, whether it is exploration, finance or production.

D. Business Activities

The nature of a company's business activities determines the size and the skill requirements of its staff. A company primarily involved in exploration will require a proportionally larger number of geologists and geophysicists than the company with a large investment in the production sector. Development activities require engineering and technical skills, whereas production demands process engineers and operators, and maintenance trades.

V. EMPLOYEES

The search for qualified technical and professional staff has been intense over the past few years. Even with the 1981 slowdown in drilling activities companies have been actively recruiting in many areas. The need for experienced employees was pointed out in many companies. This need is particularly acute for technical/professional employees with five to ten years experience. It was pointed out in the larger companies that such experienced technical experts were either hired away by smaller firms or promoted out of technical positions into the managerial stream.

This tendency (or necessity) to move employees from technical to managerial roles was noted as having a serious negative effect on companies. It was suggested that there should be a technical ladder of promotion that would parallel the managerial ladder and encourage the first rate technical professionals to continue practicing in their areas of expertise. This would help to maintain the technical capacity of the organization and would also ensure a more permanent core of senior people who could act as on-the-job trainers. This solution (a technical ladder) implies, however, that managerial positions could be filled with either non-technical professionals, or those whose technical skills are in less demand. This would be contrary to what appears to be the established approach for filling managerial ranks.

Following is a brief description of the major categories of employees in the industry.

A. Supervisory/Managerial

As already noted, these employees are drawn directly from the technical ranks of the organization. Frequently, supervisors

and managers have no formal training in management prior to their appointments and rely on company sponsored programs or informal on-the-job training.

B. Technical/Professional

The industry employs large numbers of engineers, geologists, geophysicists, computer scientists, and accountants - all of whom are in short supply. In addition, technologists and technicians (with technical school or college diplomas) are employed in virtually all technical functions.

The major problem identified in this group is a lack of supply of graduates from universities, colleges, and technical institutes. The lack of university graduates in engineering, the earth sciences, and computer science has been identified as the most critical situation and representations have been made by the industry to universities and government to increase the capacity of university programs. One reason for the situation cited by universities is their inability to recruit and retain experienced instructors because of salary descrepencies between the institutions and industry. The higher industrial salaries attract teaching staff away from universities and discourages undergraduates from pursuing graduate studies, thus reducing the pool of potential instructors.

Several interviewees suggested that the shortage of professional personnel is in part the result of underutilization of these professionals. They noted that in many instances tasks performed by graduate engineers could be performed by technologists or technicians. In fact, it was observed that several categories of jobs were being reassigned to non-professional staff.

C. Trades/Operations

Skilled trades and operations personnel are a significant manpower component of the industry, particularly on the production side. Gas plants, oil and gas production, and pipeline operations all require highly skilled personnel trained either through apprenticeship programs, institutional programs, or company training programs. Industry personnel indicated concern about the ability of apprenticeships programs to supply the required tradespeople and some companies are reacting by increasing their efforts to develop in-house technical training programs.

There was general agreement that if economic activity expands significantly in the industry, personnel in the trades/operations area would be in critically short supply.

D. Clerical/Secretarial/Administrative Support

As the oil company head offices continue to locate and expand in Calgary, demand for support personnel also expands. Employees in this category usually have a high school or general college/university background often supplemented by secretarial or business administration training programs. Although shortages in this category are not considered as critical as in the technical/professional or trades/operations categories, difficulties in recruiting were reflected in major increases in salary levels over the past few years.

E. Unskilled

In general there is a low demand for unskilled labour in the petroleum industry. Most unskilled personnel are employed in the drilling, service and construction sectors of the industry where there is no shortage of supply currently and none is

anticipated in the foreseeable future. Most training is either on-the-job or through government sponsored programs such as the Alberta Petroleum Industry Training Centre.

This brief overview of the general categories of employees in the petroleum industry has been presented to differentiate among the educational/backgrounds required for each category and to indicate where the more critical shortages are likely to occur. As stated previously the focus of the study was on the first three categories listed above (supervisory/managerial, professional/technical, and trades/operations).

VI ORGANIZATION FOR TRAINING

The capacity of a company to train its employees is related to the way in which the training function is organized within that company. In each company surveyed the training organization was documented by describing the reporting structures, the number of staff and their qualifications, and the functions undertaken by the staff.

A. Reporting Structure

Where specialized training units have developed in companies there has been a definite separation of "technical" and "non-technical" training. Technical training was the responsibility of line departments (exploration, production, etc.) whereas non-technical training was the responsibility of the Employee Relations or Human Resources department.

Technical training co-ordinators, depending on the size of the department, reported either to the department head or to the second-in-command. The co-ordinator often had dual responsibilities including either safety or research, depending on the department's function. In some companies, there was a loose network of technical training co-ordinators while in others the co-ordinators are isolated within the line departments. In only three of the companies surveyed (Nova, Gulf, and Esso) were there training co-ordinators whose responsibility was to co-ordinate technical training activities on a company-wide basis. These "co-ordinators of co-ordinators" were located in the training sections of the Human Resources Departments.

Non-technical training was in all cases the responsibility of the Human Resources Departments. The person responsible for training normally reported to the manager of HR who usually

reported to a junior vice-president. In two major Canadian companies (Nova and Petro-Canada) these were vice-presidents (Human Resources) whereas in other companies it was more likely to be a VP (Administration). Many of these training, or employee development organizations, had been set up within the past two years indicating a very recent recognition of the need for some form of central control. Prior to establishing such an organization line managers would approve the expense of employees attending external programs or occasionally bring in a consultant to teach a program.

There appeared to be no particular size at which a separate training organization was set up. Turbo, with a staff of over 2,000 had no separate training unit whereas Pan Canadian with about 1,000 employees had a training staff of three to four full time people. In some instances, a training unit would be set up for a major project division of the company and yet the main organization would have no organized training. Suncor was an example of such an organization where the oil sands operation had a large technical training unit and the Calgary head office had only a part-time co-ordinator, until recently when a full-time person was hired. Until mid 1981 Dome had the same situation with the Beaufort Sea Division; however, they have since developed a significant organization with several training co-ordinators in their Employee Relations Department.

While there is no one "best" organization for training, since each company has different requirements, there are some criteria which could be used in judging the potential effectiveness of any organizational structure. These criteria are stated below along with assessments of how well the companies surveyed appeared to meet them.

1. Contact with clients

Staff in the training unit should have direct contact with potential participants (trainees). This improves the potential for developing training which is relevant to the trainees' needs. This criterion encourages a high degree of decentralization and was observed as the norm for technical training where virtually all co-ordinators were at the department level. Non-technical trainers were more removed in the organization structure from the clients, particularly where the clients were the managers and supervisors below the department head level.

2. Organizational level

The training unit should report high enough in the organizational hierarchy to effect policy development. This criterion presumes that effecting company policy is dependent upon having a voice in the higher decision-making ranks of the organization. Although in the past, training or HRM have not had such access to the senior management, recent appointments of vice-presidents (Human Resources) indicated that organizations were changing their structures in recognition of current and future manpower crises.

3. Degree of centralization

The training organization should be centralized enough to avoid duplication of effort and to maximize the use of training resources. This presumes that certain economies of scale can be achieved by developing one unit with, say, ten people rather than five units each with two people. An example of such a saving could occur if a company wished to make use of an expensive technology such as computer-assisted instruction or video-tapes in delivering technical

training. It might not be feasible to develop such an approach for one line department whereas the company as a whole could perhaps justify the cost and effort. Centralization of the training organization would facilitate such a project.

4. Integration of training

The organization should permit and encourage integration of technical and non-technical training. The survey discovered that except in isolated instances the two types of training are completely separated organizationally. Although the content of the training programs is obviously different, benefits could result from sharing knowledge and experience regarding the process of training. In addition, integrated programs of technical and non-technical training could be more easily accomplished if the organizations were integrated. An example of such integration would be a program for new supervisors which combined a review of the technical aspects of the job with the human relations dimensions of supervision.

5. Control

The organizational structure should permit sufficient control that the use of resources can be monitored and directed toward identified priorities. The survey showed that in most companies the training organization and the training activities were so fragmented and decentralized that it was impossible to determine what programs were being undertaken and how much money was being spent. If training resources are to be directed toward resolving the most severe human resource problems rather than being spread evenly over the whole organization then greater central control over the use of training resources is required.

6. Professional status of trainers

The final criterion by which the training organization could be judged is the potential it provides for its members to progress up a ladder of promotion. Trainers and training co-ordinators should see the possibility of achieving greater status and responsibility within the training area on the basis of experience and expertise. Such a situation encourages stability and professionalism among training staff. At present, in many firms the trainer's position (especially for technical trainers) is seen as a dead end job with lesser status and pay then a line position.

B. Staffing of the Training Function

One objective of the study was to describe the staff currently involved in training in terms of their experience and qualifications. It was discovered that training staff had qualifications ranging from technical training and experience to graduate training in human relations and employee development. Technical trainers tend to have less formal qualifications in training or adult education than those responsible for non-technical training. Technical trainers, in most cases are chosen for their knowledge of specific technical processes whether it was in oil and gas field operations or in gas plant operations and maintenance. Their technical background may have been supplemented by informal, short programs on training processes and techniques but the usual case was for the individual to take on the position with no training or assistance available.

Many non-technical training staff were clerical personnel who had been transferred from another human resources area, such as wage and salary administration, and were reassigned to

administrative functions relating to training. These staff may upgrade their formal qualifications through completion of seminars or evening programs relating to training, adult education, or human relations and may be appointed to senior positions in training organizations. More recent entrants to the field tended to hold university degrees in business or the social sciences although their backgrounds usually didn't include formal courses in training or adult education.

One potential source of industrial training staff is the graduates of formal education degree programs. These programs have traditionally trained teachers for the public school system and few had found their way into the petroleum industry. It was discovered that most companies deliberately avoid hiring such individuals because they didn't believe teachers would "fit into" business or industrial organizations. However, in the four companies where ex-teachers were hired they apparently had made the adjustment very well and were assigned responsible positions in program development, instruction, and administration.

In many of the companies surveyed the training staff had been recently increased and in several they were actively seaching for personnel. It was generally felt that there was no shortage of staff with adequate academic preparation (i.e. a degree in Business or Social Sciences) but it was very difficult to find someone with industrial or business experience.

In summary, the companies surveyed considered they had adequate training staff and although they were currently in an expansion phase they generally believed there was an adequate supply of potential staff. Whether the staff is adequate or not does depend, however, on what functions the training organization is called upon to perform. In the following section the array of possible training functions will be examined.

C. Training Functions

The process of training can be broken down into a number of somewhat distinct tasks or functions. A training department will not necessarily perform all of these functions but will probably emphasize different functions in different types of training.

1. Needs Identification

There are two types of training needs - those of the individual and those of the organization. The individual may wish to improve his or her ability to do the present job or to prepare for another position in the future. The individual may see training for career development resulting in a move to another company - to the chagrin of the employer who had just provided the training. The individual's needs may not be directly related to the job but may rather be a desire for a break from the job, to travel, and to socialize with colleagues.

The company's training needs may coincide with the individual's in some areas while differing in others. The company is interested in career development only to the extent the individual is perceived to have potential and to the extent that particular skills are of high demand in the company. The company has needs of a more general nature, such as improved management skills or increased operator competence, which are not related to a single employee but to a segment of the company or to a specific major project.

The identification of the individual needs is usally done by the individual with or without input from his immediate superior. The supervisor's participation often comes only at the time an expenditure is approved - when the decision has in most instances been made. In some of the larger firms it was

noted that the identification of training needs was part of the annual employee assessment process and the needs were documented on the employee's record.

The identification of the broader company training needs must become a part of the business planning process. Decisions on expansion or contraction of certain activities or evaluations of the efficiency of current operations should indicate the areas of the organization where training resources should be expended. This implies that funds for training will not be evenly distributed over the company, available for anyone who decides he or she had a training need; but rather, will be allocated on a priority basis to specific departments or types of employees.

Throughout the survey very little evidence was seen of deliberate needs identification activities, at either the individual or corporate level. Few of those interviewed were aware of training priorities and frequently no training plan was in place. Particularly in the smaller companies, individuals were left on their own to choose from a smorgasbord of in-house and external programs.

2. Program Development

Developing training programs consists of defining objectives (or competencies to be gained), determining program content, preparing instructional materials, selecting or designing instructional methodology, and establishing means for evaluating participants' progress. Several of the larger firms surveyed were actively involved in program development but most others relied on programs developed by consultants, public institutions, or parent companies. Even in-house programs were usually designed and developed by consultants who brought their "package" into the company.

In the technical training area several companies were using outside consultants to develop on-the-job training programs. These programs make use of self-study materials and work manuals while relying on the supervisor to coach and evaluate employees.

3. Instruction/Facilitation

Instructors for in-house programs were drawn from three sources: external consultants, technical specialists within the company, or professional training staff usually in the human resources departments. In larger companies it was common to find introductory supervision or human relations courses taught by in-house trainers although most non-technical programs are instructed by outside consultants.

Where in-house technical specialists were used as instructors it was usually for a very short term (half day) and on an informal basis often only within one department. Technical instructors seldom had any training in instructional techniques whereas, occasionally, the larger companies brought in outside consultants to provide "training for trainers" in the human resources departments.

There appeared to be little innovation in instructional techniques - particularly in technical training where the dominant approach is the "stand-up lecture".

4. Program Administration

Included in this function are such tasks as recruitment of resources people, selection of participants, scheduling events, recording programs completed, and budgeting for program expenditures. Administration appeared to be the primary function of most training staff, especially those designated as

"technical training co-ordinators". In companies which depended almost exclusively on external programs or consultants brought in-house, training staff were concerned mainly with logistics and record keeping. Nevertheless, in most companies there was found to be an appalling lack of data regarding all aspects of training. It was difficult, involving much manual effort, to compile such information as how many people had taken courses, which external courses had been attended, what were the annual expenditures on various types of training, or how much was each department spending on training. Occasionally, there was no budget item for training and expenditures could be recorded in any of several categories.

Several companies were developing computer-based Human Resources Information Systems (HRIS) while others were in the planning stages. Most of those interviewed recognized the need for organized information systems if training activities were to be effectively monitored and if training resources were to be allocated on a priority basis. Such systems are also viewed as an effective vehicle for integrating training and other human resource management activities such as recruitment, compensation administration, and career planning.

Not all interviewees were in favour of better information, especially financial information. One training co-ordinator feared that if the true costs of training, including time lost from the job, were known to senior management, there would be far less money available. On the other hand, if the true costs were known there could be much more attention paid to maximizing the return from training programs.

5. Program Evaluation

Returns from investment in training can be maximized only if there are deliberate efforts to evaluate the effectiveness of

alternative training approaches. Most program evaluation observed in the study was based on individual participants' perceptions of the value of programs they had been involved in with little apparent attempt to evaluate the effect of training programs on the productivity of an individual or a work group. While recognizing that evaluation of training, or any kind of education, is a difficult task, it was still surprising to note what little effort at formal evaluation was taking place. Once again, it was only the larger firms that viewed this lack of program evaluation as a problem and had any plans to become more involved.

6. Policy Development

Policies in this study were defined as general guidelines which govern the future action of the organization. In a sense, policy development and long range planning were viewed as synonymous. Policies governing training could be expected to include statements on how and where training resources would be secured, what the major training priorities would be, and, perhaps, what percentage of total operating budgets might be spent on training.

In the almost total absence of explicit policies such as these, it could be concluded that either the policies are implicit in the structure and actions of the organization, or that very little long range planning has taken place in the training component of the industry.

Possibly both conclusions have merit. The petroleum industry tends to have an informal approach to management which attempts to minimize bureaucracy and written documentation or "red tape". This may explain the apparent lack of written policy statements or long range plans. However, the lack of data noted by manpower studies and the lack of monitoring systems

within companies suggests that this function (policy development) has not been considered particularly important.

D. Models of In-House Training Organizations

In the previous sections, training organizations in the industry have been discussed in very general terms under the headings of reporting structure, staffing, and functions performed. To give the reader a better understanding of the industry the following section presents four examples of specific training organizations. These companies were selected because they represent four different segments of the exploration/development industry - the large multi-national, the larger Canadian major, the medium sized foreign owned, and the medium sized Canadian owned.

1. Esso Resources Canada Ltd.

Training in Esso was divided into the three main categories of wage-earner training, technical training, and management training. Wage earner training was directed at those employees involved in trades or operations activities whereas technical training was only that training taken by technical professionals such as engineers and geologists.

a. Organization of wage-earner training

Departmental managers had the responsibility for wage-earner training. Where numbers of employees warranted, training co-ordinators had been appointed to assist the line managers. These co-ordinators had extensive experience in departmental operations and were generally qualified at a journeyman or technician level. They usually would not have any formal background in training or adult education. Each wage-earner training co-ordinator was responsible to a line manager and

worked quite independently within his own department. Their main responsibilities included the monitoring of on-the-job training, handling administration connected with employees taking external training programs, some on-site instruction, and assisting in compiling work/training manuals. In some departments the co-ordinators were also involved in administering the technical training programs (i.e. programs for technical professionals).

At the time of the survey there were 19 training co-ordinators in line departments and one overall wage-earner training co-ordinator in the Human Resources Department. The HRD co-ordinator had responsibility for assisting the other co-ordinators by providing information and expertise in training methodology. Although he had no direct authority over line department co-ordinators he attempted to ensure that duplication was minimized and that each was aware of the activities of the others.

Considerable effort had been put into developing training/promotion paths for hourly-paid employees. For each level of responsibility within a particular trade or skill grouping the training requirements and the sources of training were specified. The sources were either a demonstration by a supervisor, lecture by a training co-ordinator, or self study with a work manual. Most of the development effort for these programs come from the line departments, however, in one instance it was noted that an outside consultant was contracted to provide the services.

b. Technical training

Most technical training programs for Esso employees came from the technical training centre of Exxon in Houston. This centre offered a wide range of programs to professionals in Exxon and

subsidiary companies. Most programs are held in Houston although at times programs were brought to Calgary and one department (geology) had developed its own technical training facility.

Co-ordination of technical training, including liaison with the Exxon training centre, was the responsibility of the manager of management and technical training in the Human Resources Department. Individual department managers retained the responsibility for determining the training needs of their professional employees, however, in cases where in-house programs could not meet training needs, the HR co-ordinator would assist in locating appropriate external programs.

On-the-job technical training was an essential element in the training program, particularly in the initial training of recent graduates. As in most other companies Esso was experiencing difficulties with OJT because of the lack of technical professionals with 5 - 10 years experience.

c. The organization of management training

Management training was a separate organizational unit within the Organizational Effectiveness division of their Human Resources department. This unit organized in-house management training for supervisors, middle level managers, and senior management. In addition, programs are offered to assist individuals to improve their personal skills in such areas as work planning and communications.

As the organizational chart (Figure 2) indicates, the trainers were all qualified at the graduate level and had considerable experience in management training. All trainers were involved in program development and administration as well as instruction. Each trainer had responsibility for liaison with

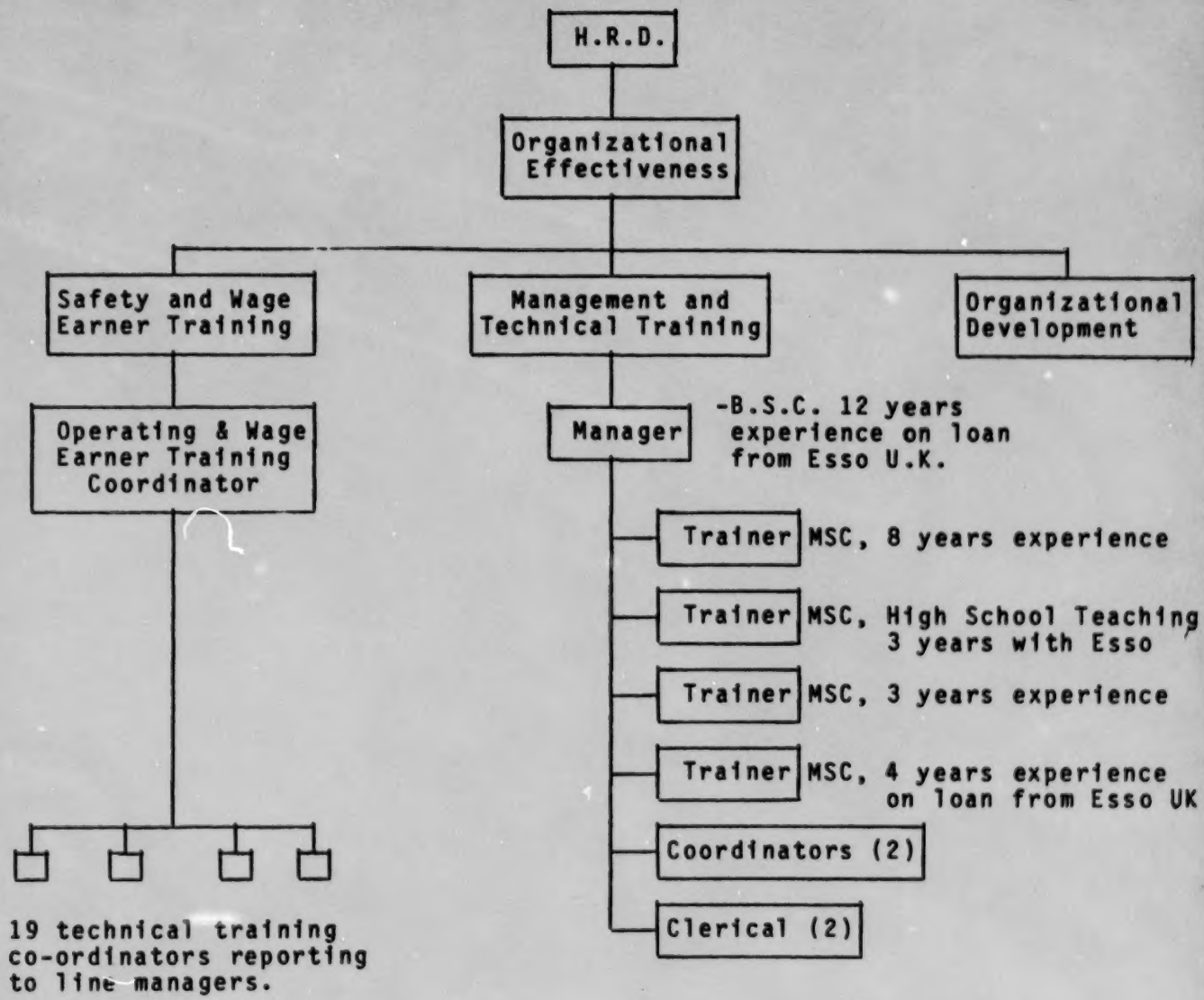
H.R.D.
Organizational Effectiveness
Safety and Wage Earner Training
Management and Technical Training
Organizational Development
Operating & Wage Earner Training Coordinator
Manager
-B.S.C. 12 years experience on loan from Esso U.K.
Trainer MSC, 8 years experience
Trainer MSC, High School Teaching 3 years with Esso
Trainer MSC, 3 years experience
Trainer MSC, 4 years experience on loan from Esso UK
Coordinators (2)
Clerical (2)
19 technical training co-ordinators reporting to line managers.

FIGURE 2

ESSO RESOURCES CANADA LTD.
TRAINING ORGANIZATION

specific departments.

The linkage with Imperial's training system was apparently very strong since many programs were either developed by Imperial and now instructed by Esso trainers, or were still offered by Imperial's training staff. These programs, along with others developed by Esso or outside consultants, are circulated throughout the company in a training guide. This training guide is compiled from information provided by line managers as a result of the annual employee assessment process, and periodic needs analyses.

d. Co-ordination of training

Although there was a separation of types of training according to its nature and audience, very deliberate attempts to co-ordinate training had taken place. Previously mentioned was the co-ordinator of wage-earner training who facilitated the information flow among the nineteen training co-ordinators in line departments. As well, the manager of management and technical training in the Human Resources department was in a position to co-ordinate both areas of training and to integrate the technical and management training where required.

In addition to these co-ordination efforts within Esso, a network of training managers was being developed in the whole family of Exxon companies. The linkages between Esso and Imperial were being strengthened and apparently even more joint training efforts would take place in the future.

e. Examples of special projects

In addition to maintaining program of seminars and workshops the training staff got involved in a number of special, one time projects. Among those projects were the following:

- Task analysis of the research activities within Esso. The objective of the analysis was to identify the specific areas of the research process which could be assisted through training or organization development programs.

- Needs analysis within the Production and Exploration departments. The training requirements and current competencies of various groups of employees were to be identified.

- Cross-cultural training. A comprehensive program had been developed for all supervisors working with native employees.

- Computer-based training. Using the PLATO system a training program for oil spill control co-ordinators had been developed.

2. Dome Petroleum

Until April 1981, Dome had no staff involved in training on a full-time basis in their Employee Relations department. At that time two people were re-assigned from the recruitment section to form the nucleus of a centralized training organization. Prior to this action several technical training co-ordinators had been appointed in the line departments. The organization described below was that which existed in March, 1982 and is presented as an example of the recent expansion of training capacity in major Canadian based corporations.

a. Employee Relations training organization

The supervisor of staff development had a staff of nine full-time employees, including four staff development co-ordinators, four administrative assistants, and one secretarial support. The supervisor reported to the manager of human resources and

was on a level parallel with the recruitment supervisor. It was noted that the training organization was on the sixth level of the Dome hierarchy - somewhat lower than was noted in other Canadian majors. This perhaps reflected the very recent recognition of the need for a separate training unit.

Of the four staff development co-ordinators, (Figure 3) two had extensive experience in training (more than ten years), one had a combination of general personnel and training experience, and the fourth had more than ten years experience in general personnel work. Two of the four had B. Comm. degrees while the others had no formal education beyond high school. In all cases it appeared that expertise in training was gained through practical experience supplemented by informal programs on training methodology. The co-ordinators each had responsibility for liaison with one or more line departments as well as co-ordinating development in specific program areas. Most of their time was apparently spent on program development, administration, and to a limited extent instruction and policy development.

The three assistants were responsible for the administration of in-house programs, facilities bookings, exit interviews, administering the education assistance program, and the collection of data concerning new program needs.

The organizational chart indicates the range of programs the organization was involved with. The E.R. training unit had responsibility for virtually all non-technical training but also co-ordinated several technical training programs. Much of the technical training was, however, the responsibility of the line departments.

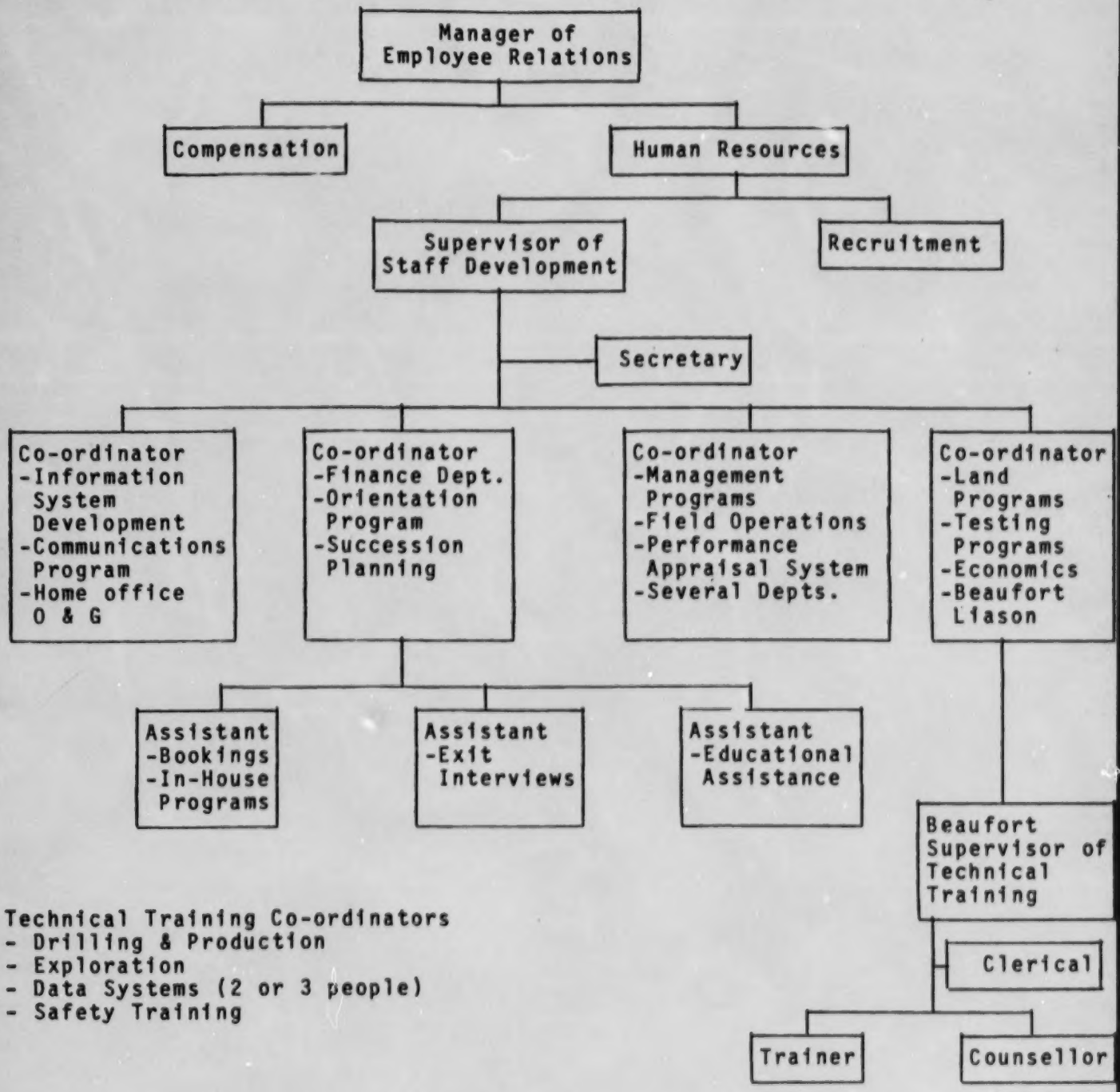

FIGURE 3

DOME PETROLEUM
TRAINING ORGANIZATION
(March, 1982)

b. Organization of technical training

Full time technical training co-ordinators were appointed in the drilling and production, exploration, and data systems departments. These co-ordinators reported directly to line managers and apparently worked independent of the ER group. In addition, there was a full time manager of accident prevention who was responsible for safety training throughout the company.

Another separate technical training organization was located in the Beaufort Sea Division. Four full-time people were responsible for development and administration of the large OJT program for drilling and marine crews. CANMAR was also involved in technical training through the use of a drilling simulator to train crews in Blow Out Prevention and other drilling practices. Although these training activities were essentially independent of the ER training unit there was apparently a stronger monitoring role developing with a suggestion that at some future date all technical training could be co-ordinated through a central training department. At the time of the survey, co-ordination of training was assisted through the existence of a company-wide training committee which met regularly to exchange information.

c. The use of external consultants

One feature of the Dome training system was the extensive use of consultants in the early stages of organization. Examples of programs developed with the assistance of external consultants were the landman program, the company and industry orientation, and the OJT program for the Beaufort marine and drilling crews. In addition, several consultants were retained to instruct programs in human relations, income tax planning, and management development.

3. Canadian Superior Oil Ltd.

Canadian Superior is a wholly owned subsidiary of a U.S. company with about 700 employees in Canada. Although they had a very small in-house training organization the company did considerable training through the use of external programs and consultants. Apparently, the recently appointed president gave impetus to the establishment of a management development program which was administered by one person on a part time basis in the Human Resources Department. The program was comprised of several modules directed at middle level managers, supervisors, technical professionals, and administrative support groups. Although the programs were taught by external consultants the training supervisor apparently had considerable imput into their content and format. The programs were offered to all senior employees with selected components being mandatory. Judging from the levels of participation the program had considerable support within the company.

Technical training programs also depended on external resources but differed from management training in that programs were seldom brought in-house. Rather, individual employees were sent to programs sponsored by external consultants or institutions. Line managers had responsibility for technical training and because of the relatively small numbers of employees no full-time co-ordinators had been appointed. The company had a general policy under which all professionals could expect two weeks of formal training per year with considerably more in the first year of employment.

Canadian Superior is presented here as an example of how a small to medium sized company can maximize its use of external training resources with a very small internal training organization. Bringing programs in-house for non-technical training permits central monitoring of the program content, the

selection of participants, and the integration of the various components of the program. The obvious support of senior management has facilitated considerably more program planning than was observed in most companies.

4. Turbo Resources Ltd.

Turbo is a fully integrated Canadian company with some 2,200 employees. It developed rapidly over the past few years and probably exemplified the young, aggressive style of management to be found in many small to medium sized Canadian firms.

That training was not considered a high priority was obvious in the lack of a training organization. The training that did occur was largely initiated by individual employees who sought authorization to attend outside training programs. The manager of human resources had brought in-house a number of consultants for management training but not within a systematic training process.

This lack of training was considered by the manager of human resources to be typical of companies such as Turbo and a situation which would change as the company matured and stabilized. He foresaw that eventually Turbo would have a specialized training unit with full-time trainers and co-ordinators, but in the meantime the company would continue to give priority to the technical and financial aspects of its operation.

5. Industry Wide Training Organizations

The petroleum industry presents an interesting combination of competition and co-operation. The firms are fiercely

competitive in activities such as bidding for leases and exploring for oil and gas but are, of necessity, co-operative in production arrangements such as unitization. They compete for experienced manpower yet combine their voices through such organizations as the Canadian Petroleum Association (CPA) and the Independent Petroleum Association of Canada (IPAC) when talking to government.

This same situation exists in the field of training. Many companies maintain that their internal training programs produce employees with such highly developed skills that the company enjoys an advantage over the competition. Consequently, they are reluctant to share their training approaches with the industry as a whole. At the same time these firms complain that their trained personnel are being lured away by smaller firms thus continuing the situation where the large companies are "trainers for the industry".

This competitive stance regarding training is balanced against such displays of co-operation as the establishment of the Petroleum Industry Training Service (P.I.T.S.) which was organized with the active encouragement of CPA, CAODC, and IPAC. P.I.T.S. operates with a board of directors and numerous program advisory committees drawn from the industry. Although P.I.T.S. has a broad mandate to provide training for the industry, it has to date been largely restricted to providing programs for the drilling and operations side of the industry. Many of those interviewed in the survey confirmed that P.I.T.S. is perceived to play a limited role as a vehicle for a co-operative approach to training. Nevertheless, many individuals thought that in the future P.I.T.S. or some other organization must be used to bring together the resources of the industry to tackle industry wide training requirements. A major stumbling block to such co-operation is bound to be the perception that the companies must compete in training as in other facets of

their business.

This lack of industry wide co-operation and organization in the training area tends to perpetuate the very situation the large companies lament. The large companies can, at present, institute training programs for newly graduated technical professionals because they have sufficiently large numbers of new recruits to warrant programs. However, small to medium sized companies have such small intakes of new employees that in-company programs cannot be justified and they must either look to an outside program to bring their new recruits "up to speed" or they must hire experienced employees. Since no training programs have been available they choose the second option, continuing to hire away from the majors.

This section of the report has presented findings regarding the organization of training both within individual companies and across the industry. The company training organizations were found to vary tremendously in terms of size, complexity, and function; no doubt reflecting the characteristics of their host companies. The difficulty of achieving co-operation in a competitive industrial environment was noted when discussing industry wide organizations.

The next section will examine the actual training programs which were undertaken within the companies surveyed.

VII TRAINING PROGRAMS

This section begins with the presentation of a model of industrial training followed by descriptions of each segment of the model as it exists in the petroleum industry.

A. A Model of Industrial Training

The model in Figure 4 divides training into three major categories, based on the stage of employment at which an employee would become involved. Pre-employment education or training tends to take place in publicly supported educational institutions and provides the individual with the skills and knowledge required to enter an industrial occupation. Since this phase of training was not the focus of the study it will not be examined in depth.

The second stage is termed Initial Industrial Training and is defined as that training designed to equip an employee to competently perform in an initial job placement. This definition implies that the individual is now on the payroll of the company but is not yet competent to perform independent of close supervision. Training programs have been arbitrarily classified as either industry or company orientation or job specific training although it is recognized that these objectives often overlap and may be addressed within a single program. The model indicates that within each type of training several different modes of delivery are possible.

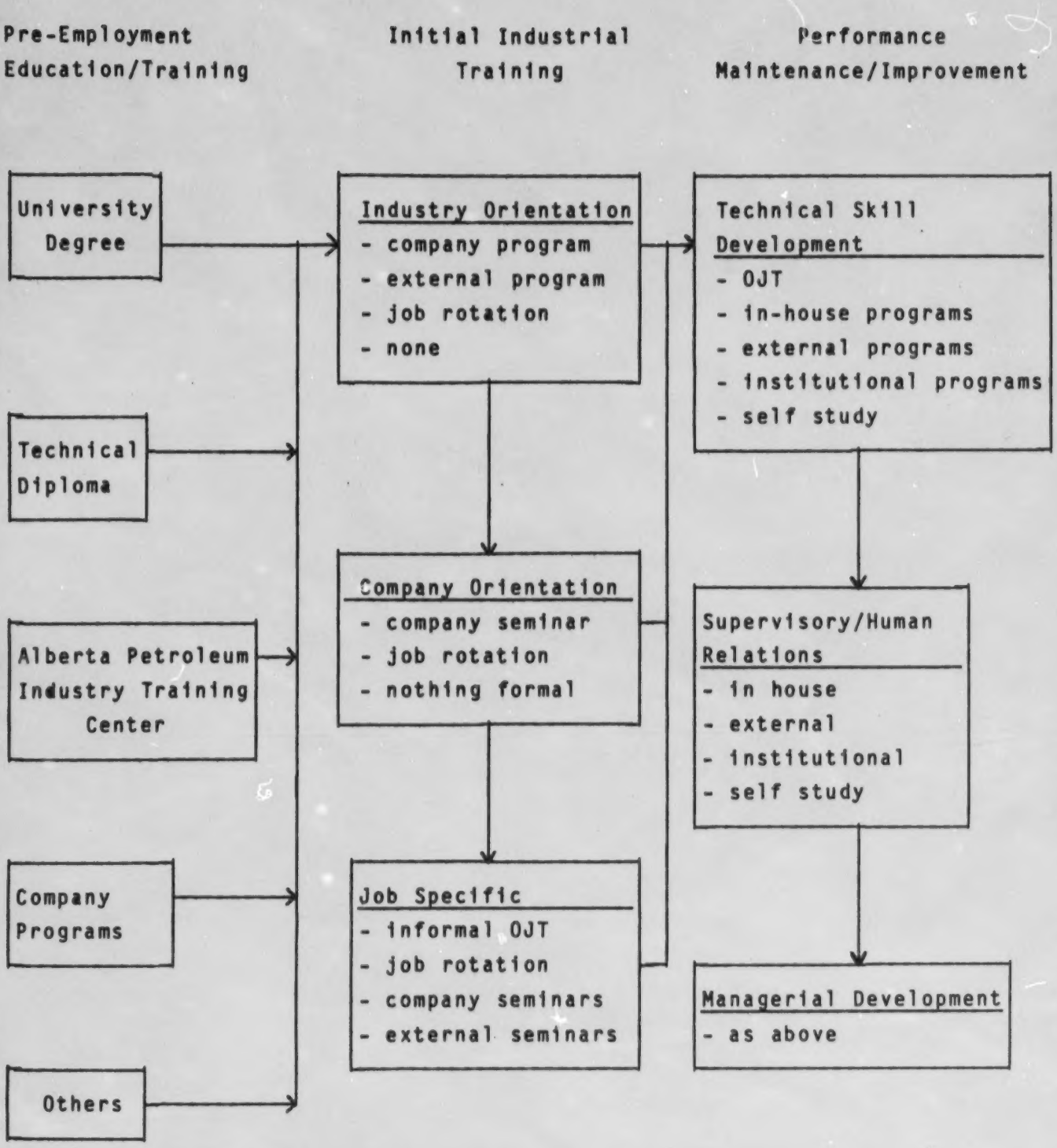

FIGURE 4
A MODEL OF INDUSTRIAL TRAINING

Training in the final stage, Performance Maintenance and Improvement, enables an employee to continue in an initial job (without becoming obsolete) or to be promoted to more demanding positions. The model is based on the observation that most supervisors and managers come from the technical side of the industry and will, therefore, become involved in some technical skill development before either supervisory or managerial training.

B. Pre-Employment Education/Training

Most interviewees were satisfied with the quality of graduates from post-secondary education programs. They did not expect graduates to fit directly into jobs but considered a period of initial training was required. It was accepted by most that the institutions should provide a more general "education" while the industry would do the necessary "training". (Education tended to be defined as knowledge based and training as skill based).

One pre-employment training program which is more skill related is at the government sponsored Alberta Petroleum Industry Training Centre. Graduates of this program are employed in the drilling segment of the industry.

In only one instance was it reported that a company was directly involved in pre-employment training. Foothills Pipeline in co-operation with the provincial and federal governments was involved in a program for natives at Grourd in northern Alberta. This program was designed to assist native people to learn basic skills which would allow them to compete for entry-level jobs in the pipeline industry. The company participated in the program planning stage, provided funding and eaching resources, and assisted in placing students in jobs.

One other avenue for industry participation in this stage of training is through the funding of programs offered by educational institutions. Although this was not a direct concern of the study, several individuals volunteered that industry would be prepared to directly fund programs which would help to allieviate shortages of manpower in critical areas. The fact that this arrangement has not become more common should be a matter of concern for the institutions and should probably be explored further.

Two further means for industry participation in pre-employment training are through the provision of instructors and participation in co-operative education programs. At present, rather than providing instructors to institutions, industry is hiring away badly needed instructors. This is not a problem which can be resolved by the industry alone but will require action by the institutions and/or the governments.

Co-operative programs permit students to gain practical experience in industry as an integral part of their education. Although several programs are in operation, this pattern has not been adopted in most local institutions. It was suggested that if the co-op approach was expanded, industry could through its participation help to ensure that programs are more relevant and practical.

This brief discussion was intended only to indicate that the petroleum industry appears to have had minimal involvement in pre-employment training to date and that several avenues for future involvement may be explored. The following section describes programs of initial training which tend to be more directly controlled by the industry.

C. Initial Industrial Training

The model of industrial training designates three types of training at this stage. Activities in industry orientation, company orientation, and job specific training are briefly described below.

1. Industry orientation

Until recently no formal programs orienting people to the Canadian petroleum industry were available locally. Presumably, orientation to the industry was obtained through interaction with more experienced colleagues. Approximately four years ago (1978) private consultants from the U.S. began offering two day seminars designed to provide a general introduction to the industry. These were so well attended that a number of local consultants have developed programs which are now offered in-house in a number of companies. The programs vary in length from one to three days and are usually offered to a mixed group of technical and non-technical personnel.

The most recent development has been a two day program developed by P.I.T.S. and offered to the industry in general. Plans are underway to expand this program by giving more in-depth coverage of specific topics and providing a certificate upon completion of a number of different seminars.

2. Company orientation

It appears that most company orientation, aside from two or three hours of orientation to personnel procedures, has been mainly achieved through an informal on-the-job-training (OJT) approach. In some of the larger companies professional employees were rotated through the major departments to familiarize them with the various operations. This practice is

less common than in the past because of the difficulties in recruiting. It appears that when manpower is in short supply a new employee is more likely to be assigned immediately to a permanent position where he or she will be productive much sooner than if a rotation system is used.

At least one firm (Dome Petroleum) considered company orientation important enough to develop a three day program for all new employees. These three days were combined with a two day industry orientation resulting in a week long program which was attended in the initial week of employment.

As firms become larger and the organization and technology more complex, it can be anticipated that more formal orientation programs will be instituted. This will be especially true as more employees are recruited from outside the industry with little or no familiarity with its operations.

3. Job specific training

This stage of training takes place following the hiring of an employee, but proceding the time when he or she can completely perform in a position. This definition excludes most technical training since the petroleum industry, like most others, has a hierarchy of jobs with the lowest jobs requiring little or no specialized skill or knowledge. Individuals are hired into a position appropriate to their background and trained "on-the-job" to progress up the ladder as long as they can demonstrate new competencies and as long as more senior positions are available. Consequently, most technical training carried on within the industry is aimed at improving the competencies of employees who have already reached the first rung on the ladder. Exceptions to the general pattern do exist however, and the following examples were noted during the survey.

a. Delta Projects-Training of Draftsmen

Delta Projects is a consulting firm with 200 - 300 employees providing design, construction and procurement services to the petroleum industry. One of their major manpower requirements is for skilled draftsmen, particularly in the process piping and electrical areas. The usual source of this type of personnel is from programs at institutions such as the Southern Alberta Institute of Technology (SAIT). Inexperienced graduates of a one year SAIT program would normally be recruited as junior draftsmen who could progress through the intermediate and senior ranks over the course of five to ten years.

Recent shortages of potential recruits encouraged Delta to establish an in-house training program with the co-operation of SAIT and the federal department of Manpower and Immigration. The program is modelled after the SAIT program and incorporates all of the components of the process piping program at SAIT. The basic drafting component (about one half the program) is taught at Delta by a full-time Delta instructor. The other half of the program is taught by SAIT instructors usually at the SAIT campus. The program is a combination of 12 week periods of full-time instruction separated by periods of production experience spread over a total time of three and one half years. At the end of the training program the trainee receives the SAIT certificate and is expected to be at about the intermediate draftsman level with Delta.

The federal government, through the Canada Manpower Industrial Training Program (CMITP) funded the program at the rate of $250/week/trainee to a maximum of $23,000 per trainee. These funds must be used to help pay the trainees' wages and were conditional upon the selection of trainees who had no previous formal training in drafting.

Several benefits of this arrangement were pointed out by company officials. The company hopes to obtain up to 50% of its drafting manpower requirements through the program and foresees that the graduates will not only have a good generic training but will be familiar with the company's operation and may become long term employees. The trainees benefit through receiving financial support during the training program, valuable practical experience, and a recognized SAIT certificate. The government also fulfills its objective of increasing the pool of highly skilled manpower in an area of critical shortage.

This program at Delta Projects is presented as one of the very few examples of active co-operation between the three major partners in industrial training -- the private corporation, the government, and an educational institution. The following example demonstrates how one company implemented an initial training program on its own.

b. Dome Petroleum - Landman training program

A novel approach to the training of landmen was developed by Dome Petroleum after they concluded that the trained professionals they were seeking were not available in the manpower market and it would take too long to train people through the traditional on-the-job approach. Instead, they developed an intensive twelve weeks training program that would be completed before the trainees were placed in positions within the company.

Through a national recruitment campaign, approximately thirty trainees were selected for the program. All canditates had at least a bachelors degree, usually in commerce, and many had MBA's. They were put on salary immediately and guaranteed a position if they successfully completed the training program.

The program was designed with the assistance of an outside consulting firm (The Training Group) and utilized instructors from inside the company as well as leading experts from outside. A major component of the program was a simulation developed specifically for this program, which provided trainees an opportunity to practice some of the theory in a controlled environment.

This program is the only example found in the survey of a company prepared to put its training efforts "up front", before an employee has spent a minimum period on the job. It was pointed out that in this type of program the company runs some risk of losing its investment but nevertheless the potential benefits, in this case, outweighed the potential loss.

These two examples of initial training were not intended to be representative of the petroleum industry, but rather, were presented as possible models other companies might consider. As noted previously, most companies' efforts are currently focussed on the final stage of industrial training which is the subject of the next section.

D. Training for Performance Maintenance and Improvement

The model of industrial training (Figure 4) divides this stage of ongoing industrial training into the three areas of technical skill development, supervisory or human relations training, and managerial development. The following sections deal with each of these topics by describing generally the activities of the industry and then giving specific examples of program developments.

1. Technical skill development

The major methods of technical training are on-the-job training

(OJT), in-house courses or seminars, external programs offered by private consultants, external programs offered by institutions or associations, and self study.

a. On-the-job training

The training method used most frequently and considered the most effective was on-the-job training. The effectiveness of OJT generally, in all industries, is dependent upon two major factors: the availability of an experienced and well trained core of supervisory staff and the provision of sufficient time and instructional aids for the supervisors' use. Supervisors should, ideally, be trained not only in the technical aspects of their jobs but should, in addition, be trained in the most effective methods of instructing an OJT program. The program itself should indicate the principal competencies to be acquired and a means of monitoring an employee's progress. In addition, the supervisor should be provided with aids in the forms of manuals, videotapes, computer simulations, etc. which will supplement the supervisor's efforts. The absence of those conditions could result in a situation where OJT is a hit-and-miss affair with employees receiving poor training and perpetuating the bad practices along with the good practices of their supervisors.

The petroleum industry relied heavily on OJT but suffered from a lack of experienced personnel in many key technical areas. Consequently, the potential effectiveness of OJT programs was greatly reduced unless efforts were made to provide more instructional aids to compensate. With several notable exceptions, the firms surveyed had not made such compensatory efforts but rather, had relied on somewhat unstructured and haphazard OJT to accomplish the bulk of their technical training.

It appeared that the largest efforts to improve OJT were made with the trades/operations type of employees. For example, in their gas processing operations Shell Canada had linked the training and promotions processes very closely to provide some structure to the OJT and to provide motivation to the employees. Testing was done throughout the program to ensure competencies were acquired.

Another example of a systematic effort to improve the effectiveness of OJT was provided by the Beaufort Sea Division of Dome Petroleum. With the assistance of an outside consultant, a competency based OJT program was developed for the drilling and marine crews operating in the Beaufort Sea. The program identified competencies to be acquired, provided the means of acquiring the competencies, and indicated methods for assessing whether or not the required competency level had been achieved. In addition, all supervisory staff were given special traifning in how to serve as effective trainers within the system.

Although several other examples of formalized OJT programs for trades/operations personnel were identified, no similar programs were discovered for technical professionals or managerial personnel. The only evidence of systematic OJT for engineers and geologists was the formal job rotation instituted in a number of large companies. Even in these instances there appeared to be no explicityly stated goals (or competencies) to be acquired through such rotation. Rather, it was implied that the mere exposure of a novice professional to a more experienced colleague would result in the transfer of knowledge, skills and attitudes. This was referred to by several interviewees as learning through "osmosis".

b. In house courses and seminars

This appeared to be the most common method of technical training for technical professionals within the large multi-national companies. The Canadian subsidiaries were able to take advantage of programs developed and offered by the parent company. In several companies there was a set pattern of courses a new recruit would take over the first two to three years. During this time an employee could take from six to eight weeks of training per year, often out of town at the parent company's training centre. With rapidly increasing costs of transportation and accommodation this practice has become very expensive and several Canadian subsidiaries were either developing some of their own programs or were arranging for parent company programs to be offered locally. However, even with these recent developments there did not appear to be a large capacity to delivery in-house technical programs locally.

Canadian companies, whether large or small, did not utilize in-house technical seminars very extensively. Nova was making moves in that direction through the development of a technical training centre but they still had not recruited any full time instructional staff which is probably a necessary step for a continuing operation. In-house technical seminars in most Canadian companies tended to either use private consultants who brought their "package" with them or were short, informal workshops (usually one half day in length) conducted by a senior technical member of staff.

The problem of utilizing senior technical staff as trainers was pointed out in several interviews. From the staff members' viewpoint it can be a great deal of work with little payback

because, they contend, the companies don't appreciate this form of contribution as much as what could be achieved with the similar effort in the regular job. Companies often reinforce this conclusion either by being reluctant to release staff to conduct training or by designating junior, inexperienced professionals as the trainers. The result is that the industry, with the exception of the multi-nationals, relies heavily upon the full-time private consultant to provide technical training either through in-house or external seminars.

c. External programs by private consultants

These programs tend to be designed primarily for the technical professional (i.e. engineers, geologists, geophysicists, etc.) and can be from one day to two weeks in length. Although in the past the programs were usually offered in locations in the U.S. the consultants are now tending to include Calgary in their tours.

Those interviewed were generally satisfied with the quality of such programs but they indicated several problems. One concern was the timing of the programs. Rather than scheduling a training activity to fit in with the development program of a technical staff member, the timing is dictated by the outside consultant. The trainee may not yet be ready for that particular seminar or perhaps could have used it six months ago when he or she was beginning a new project.

The expense involved in sending participants to out-of-town seminars was considered a problem by some of those interviewed. However, one technical training co-ordinator in an exploration department frankly stated that out-of-town seminars are treated as much as "perks" as training events. He suggested that even

if some programs were offered locally individuals and companies might choose to utilize the more distant seminar. This poses an interesting problem for those managers or trainers who wish to rationalize training expenditures on a cost/benefit basis. How much do such perks contribute to the productivity of a company? Perhaps quite a lot if they result in a more dedicated staff member; but how does one weigh that expenditure against the cost of improving an on-the-job training program for junior technicians?

A final problem concerning external seminars was that full time teaching consultants are sometimes out-of-touch with the most current technology. They may have left an industry position several years ago and are still teaching how things used to be. It was also suggested that this was not a serious problem since companies would soon identify seminars which were not current and demand for the program would fall off.

d. Programs sponsored by institutions and associations

There are three major providers of technical training in this category. They are the industry oriented institutions such as P.I.T.S., the more general educational institution such as SAIT or The University of Calgary, and the professional associations such as the Canadian Institute of Mining. Each of these institutions or associations tends to cater to a particular type of employee and usually specializes in one or more facets of the industry.

P.I.T.S. is the only industry wide, Canadian training institution sponsored directly by the petroleum industry. As was previously indicated, P.I.T.S. offers programs mainly for the trades/operations personnel and the non-degree technician. Interviewees generally thought the programs were of high

quality and relevant to the industry's needs. There were some criticisms, however, that certain programs were too inflexible. It was suggested the industry would be better served if individuals could choose to take only selected modules out of a program rather than having to do the whole program. It was further suggested that P.I.T.S. should get directly "into the field" when developing programs rather than relying too heavily on program development committees. Finally, it was suggested that P.I.T.S. could be more innovative in the development of training programs that could be used in-house, perhaps by individual employees at remote locations. This final suggestion implies the use of training technologies such as videotape or computers.

Educational institutions assist in the maintenance and improvement of technical skills through the provision of seminars and workshops, apprenticeship programs, and regular degree or diploma programs. Technical seminars, usually offered through continuing education departments, did not constitute a very significant part of the technical training programs (compared with the offerings of private consultants).

Apprenticeship programs overlap the model's initial training stage and the stage devoted to the maintenance and improvement of technical competence. The industry depends on these programs for highly skilled manpower in the operations/production areas and in several instances were quite critical of current programs. The inflexibility of program structures has already been identified in an earlier section of this report. In addition, both the program content and the instructors are thought to be "out-of-touch" with current practices in industry. Instructors were said to be teaching techniques which haven't been used for ten years. Industry was also criticized for not co-operating more closely with the technical institutes. It was suggested that companies should

be employing more apprentices and should also be prepared to serve on the advisory committee of the institutes. Given the critical need for highly skilled manpower which at present are provided primarily by apprenticeship programs, it appears that greater co-operation and support may be required in the future.

The regular degree and diploma programs of the institutions are designed primarily for full time students to be taken prior to initial employment. However, full time employees within the petroleum industry are encouraged through company policies to attend programs on a part time basis. All companies surveyed had plans whereby employees would be reimbursed all or part of the expenses associated with attending such programs. Generally, these plans permitted employees to attend only on their own time but were not too restrictive in the type of programs selected. Only one organization (The Energy Resources Conservation Board) had a policy under which an employee could be granted a sabbatical leave to be used to pursue full time study. At the ERCB, selected employees were able to attend full time programs at a graduate level and continue on salary at a rate of 15% of current salary for each previous year of service.

In general, the educational institutions were not viewed by industry representatives as having a large role in the maintenance and improvement of employee competence. The institutions were apprently regarded as sources of pre-employment training. If this is the current situation, it raises the issue of whether or not the enormous instructional resources of the institutions are being utilized in the most effective manner. Perhaps arrangements are possible under which the institutions contribute more directly to the industry's continuing needs and receive the benefit of

continual instructor update and increased industry support in return.

Professional associations also provide opportunities for technical training by sponsoring workshops, seminars, and conferences. Through such events technical professionals can focus on highly specific technical topics of interest to more than one company and can exchange information on an informal basis. These association sponsored meetings were viewed as means of keeping up with the state-of-the-art in specific disciplines. This method of technical training is only available to the highly qualified technical specialists since other categories of employees do not traditionally have such associations. However, other company sponsored associations such as the Canadian Association of Oilwell Drilling Contractors (CAODC) have developed training programs which are available to their membership.

The final method of technical skill development is through self study. This can vary from a completely informal activity during which the employee studies on his or her own time using materials available from the local library, to a company sponsored program in which the employee has access to training materials purchased or developed by the company. Although this is probably one of the most wide-spread and effective method of training, it is also the hardest to document and assess. While some companies are making modest efforts at providing study materials, no organizations appeared to have programs to actively promote self study through a system of encouragement and rewards. This situation is understandable when one considers the difficulty in determining what new knowledge and skills have been learned through such a method. (Although it may be equally difficult to assess the amount of learning that takes place in a formal classroom setting, we can always fall

back on measuring the amount of effort that went into the learning activity -- something we cannot do when the employee is studying on his own).

This completes the discussion of the primary methods of maintaining and improving employees' technical competence. However, before leaving the topic of technical skill development, reference should be made to some of the excellent work being done in outlining typical training paths that an employee could follow in developing technical competency. Figure 5 shows an overview of the technical training profile of production engineers at Gulf Canada Resources. Each of the training activities indicated has been further broken down to define the competencies required and to suggest the appropriate methods for receiving the training.

Another example of such analysis was provided by Nova who have produced "Development Guides" for most of their technical positions. These guides outline the competencies to be achieved over specific time periods and the sources of appropriate training. Planning of this type not only provides the individual employees with a map for plotting their own development, but also assists the supervisor in monitoring employee development and guides the training staff in developing or locating appropriate technical training programs.

2. Supervisory/Human Relations Training

Much of the non-technical or human relations training for supervisors took place in-house. It appears that in most cases supervisory training was the first formal training program to be offered in-house. The programs were usually offered through the personnel or human resources department and would either use their own training staff or an outside consultant.

Companies without their own in-house programs could choose from a variety of programs offered by consultants or educational institutions.

Introductory programs in this area tended to be two to five day seminars covering the general topics of work organization, delegation, leadership styles, communication, etc. There were also numerous short programs available which concentrated on narrower topics such as interpersonal communication, handling difficult employees, or making oral presentations.

Several companies had adopted "packaged" programs from organizations such as Xerox. These programs can be offered in-house using a trainer with limited skills or background in human relations training and were considered effective for first line supervisors by several interviewees.

3. Managerial training

Management development programs tended to be either in-house seminars of up to one week in length; external seminars of similar length, content, and format; or longer residential programs such as those at the Banff School of Advanced Management. The length of programs appeared to vary directly with the level of managers being trained. Junior managers would most likely attend two or three day in-house programs whereas middle level managers would be more likely to attend one to two week programs at an out of town location utilizing "high powered" management consultants. The executive development programs at locations such as Harvard, Stanford, or Western Ontario were usually attended only by vice presidents or senior department heads.

The emphasis in many local programs was on the human relations

dimension of management, reflecting a concern that managers chosen from the technical ranks would not have developed "people management" skills. Several of the multi-national firms had also incorporated a number of structural problem solving programs (such as Kepner-Tregoe) into their array of programs.

Comments from several interviewees indicated that although management (and supervisory) development programs were necessary they may not be particularly effective at times. There was concern that often the skills taught at a training program could not be applied back in the organization because of constraints in the company's management system. It was even suggested that such a program could have the negative effect of making a manager discontent with his company's current management practices. For these reasons and for reasons of economy, most companies preferred to offer programs in-house where they would have more control of content and could influence which managers would participate. Even with in-house programs, however, skepticism about the practical value of management training was expressed - one interviewee referred to such programs as "charm schools".

The variety of programs in management development is illustrated in Appendix C. The extent of effort is also indicated through the use of program/days. The data appear to bear out the conclusion that the greatest training efforts are made by the large firms with the least effort made by the smaller, Canadian firms.

VIII INNOVATIONS IN TRAINING

One of the purposes of this survey was to familiarize the author, the sponsors, and the readers in general with the current state-of-the-art in training in the petroleum industry. Several examples of unique or innovative programs have been used as examples of particular phenomena throughout the text. In this section some of those will be briefly restated and other projects will be noted.

A. Competency-based programs

Several competency-based programs have been developed for the trades/operators category of employee. Some of these have been developed by in-house training staff while others have used external consultants.

1. Beaufort Sea Drilling and Marine Crews Training Program

This competency-based OJT program has been noted before as a comprehensive approach to a difficult training problem.
Contact: Bruce Klatt, Supervisor of Staff Development
Dome Petroleum

2. Nova Corporation

Of particular interest was the use of "Development Guides" as the basis for the development of a competency-based training system. Detailed curriculum development was on-going at the time of the survey.
Contact: Bill Petrick, Technical Training Co-ordinator
Nova, An Alberta Corporation

3. Esso Resources

Several programs were in place at the time of the survey. Some use was made of outside resources but development was mainly accomplished by company staff.

Contact: Fred Bewer, Technical Training Co-ordinator
Esso Resources

B. Training Facilities

Most large companies had some physical space dedicated to training. In many instances this was no more than a single classroom with minimal instructional aids. However, the following examples illustrate the type of addition effort some companies were putting into this component of training.

1. Transalta Utilities Technical Training Centre, Red Deer

Although this centre was designed to train technicians in an electrical utility it is included here because many of its features could serve as a model for companies in the petroleum industry. The centre is well equipped to provide practical demonstrations and "hands on" experience as well as classroom instruction.

Contact: Bill Payntor, Manager, Safety and Trades Training
Transalta Utilities Corporation

2. Nova's Technical Training Centre

This centre was recently opened in a renovated building in southeast Calgary. It has a number of well-equipped classrooms that will be used as a centre for the corporation's technical training activities.

Contact: Bill Petrick, Technical Training Co-ordinator
Nova

3. Esso Resources

In their new corporate offices Esso has designed a suite of classrooms for use in their supervisory and management development program as well as technical programs.
Contact: David Ellerington, MPT Training Co-ordinator
Esso Resources Canada Ltd.

C. Initial Training Program

The following examples have been described in some detail in a previous section.

1. Delta Projects - Drafting Training Program.
Contact: David Watson, Manager of Employee Relations
Delta Projects Limited.

2. Dome Petroleum - Landman Training Program
Contact: Bruce Klatt, Supervisor of Staff Development.

D. Needs Assessment

A certain amount of needs assessment takes place in all training projects - whether the assessment is formal or informal, explicit or implicit. The following example demonstrates how a formal needs assessment can be incorporated into the design of training for technical professionals.

Gulf Canada Resources - Production Engineers Training Profile

As a first step in developing a training plan for this group of engineers an analysis of the required skills was undertaken (Figure 5). This needs analysis was completed by the line managers with the assistance of the technical training co-ordinator. The results were incorporated into a detailed training plan.

PRODUCTION DEPARTMENT TECHNICAL TRAINING PROFILES

SUGGESTED TRAINING PERIOD / GROUP		0 - 6 MONTHS	6 - 12 MONTHS	12 - 18 MONTHS	18 - 24 MONTHS	24 - 36 MONTHS
RESERVOIR ENGINEERS		Petroleum Industry Orientation Technical Report Writing Basic Reservoir Engineering	Basic Petroleum Geology Well Log Analysis I Core Analysis Fluid Analysis Drill Stem Testing	Well Log Analysis II (Cased Hole) Pressure Transient Analysis	Petroleum Economics	Advance Logging III Advanced Reservoir Eng. Reservoir Simulations
DEVELOPMENT OPERATIONS (ENGINEERS)	ENGINEERING SERVICES	Petroleum Industry Orientation Technical Report Writing Well Completions (HTSC or OGCI) Basic Petroleum Geology	Well Log Analysis I Basic Reservoir Engineering Core Analysis Fluid Analysis	Advanced Open Hole Logging Production Testing Pressure Transient Analysis	Well Log Analysis II (Cased Hole) Basic Petroleum Economics	Production Operations
	TECHNOLOGY	Petroleum Industry Orientation Technical Report Writing Well Completions (HTSC or OGCI)	Basic Petroleum Geology Well Log Analysis I Core Analysis Fluid Analysis	Advanced Open Hole Logging Production Testing Pressure Transient Analysis	Well Log Analysis II Basic Reservoir Engineering	Basic Petroleum Economics Production Operations
	RESERVOIR	Petroleum Industry Orientation Technical Report Writing Basic Reservoir Engineering Pressure Transient Analysis Well Log Analysis I	Basic Petroleum Geology Core Analysis Fluid Analysis Drill Stem Testing Production Testing	Well Log Analysis II Advance Open Hole Logging		Basic Petroleum Economics Production Operations
	OPERATIONS	Petroleum Industry Orientation Technical Report Writing Production Operations (T.O. Allen OGCI) B.O.P. and Well Control Safety Courses	Production Testing Core Analysis Fluid Analysis	Pressure Transient Analysis Basic Reservoir Engineering Basic Geology	Well Log Analysis I	Well Log Analysis II
ENHANCED RECOVERY ENGINEERS		Petroleum Industry Orientation Technical Report Writing Basic Reservoir Engineering	Basic Petroleum Geology Well Log Analysis I Special Core Analysis Fluid Analysis	Basic Petroleum Economics Advanced Reservoir Engineering	Enhanced Recovery Course	Phase Behaviour (Research and Development of Gulf) Reservoir Simulations Production Operations III (Surface-Mainly Equipment)

FIGURE 5

GULF CANADA RESOURCES
TECHNICAL TRAINING PROFILE

Contact: Len Rassmusson, Technical Training Co-ordinator
Gulf Canada Resources

E. Industry Orientation Programs

Most industry orientations are either offered in-house or by private consultants to the industry in general. The following program has been developed by P.I.T.S. and will be available in the Fall of 1982.

Petroleum Industry Training Services - Industry Orientation

This program consists of an initial general course which may be taken in the evening or as a two day session. Individuals who have completed this or another similar program can then select a number of more specific seminars, each of which deals in depth with a single aspect of the industry. Completion of several seminars entitles the individual to a certificate offered by P.I.T.S.

Contact: Wayne Wetmore, Manager of Training and Development
Petroleum Industry Training Service

F. Use of Innovative Training Technology

Throughout the study data were collected regarding the use of such technology as videotapes, computer-assisted learning, teleconferencing, videodiscs, etc. Very few examples were noted of systems in operation, however, several projects were in the planning or development stages.

1. Canadian Association of Oilwell Drilling Contractors (CAODC)

CAODC has developed a training program for drilling personnel which makes extensive use of videotape packages. The intent is

to have a program which can be used on-site, even in remote locations.
Contact: Robert Peel, Manager of Training

2. Computer-Assisted Learning - Esso Resources

Only one company-sponsored project was reported in the survey. Esso is in the development stage of a program for oil spill control. Although several other companies expressed interest in the use of computer technology in training they considered the initial investment to be too high for one company to justify.
Contact: David Ellerington, MPT Training Co-ordinator
Esso Resources Canada Ltd.

3. Petro Canada, Information System Department

In most major companies, one of the major training concerns was in the use of computer technology. It was considered essential to provide training programs for both those who developed and operated the systems and those who used the systems.

Although Petro Canada has not developed its own computer-based training program it was making extensive use of privately developed programs, along with videotapes also developed privately. These programs focus on information processing technology rather than petroleum technology and consequently are marketed to industry at large.
Contact: Margaret Rowe, Education Co-ordinator
Information Systems Department
Petro Canada

IX PROJECTION OF TRAINING NEEDS

One of the principal objectives of the survey was to identify the future training needs of the petroleum industry. Interviewees were requested to indicate their companies' major future training requirements in as much detail as possible. The responses to this request were generally disappointing. There was agreement that since the supply of technically qualified personnel was not going to keep pace with the anticipated demand, more technical training would be required within the industry as opposed to in the institution-based pre-employment programs. However, the nature of that training (i.e. the specific training programs) had not been anticipated and few were willing to make firm projections. The conclusions of the study, therefore, tend to state only general program areas where future demands might be concentrated while focussing more directly on the means by which programs might be developed and administered. The general areas where increased training could be anticipated are listed below.

A. Technical professionals (e.g. engineers, geologists, geophycists)

Suggestions were made that programs must be devised to bring new professionals more quickly "up to speed" rather than allowing for a two to three year initial training period.

It was further suggested that programs should be developed to train non-professionals or those trained in other fields to perform tasks which had previously been reserved for graduate engineers or geologists. For example, programs could be designed to train general science graduates to become exploration geologists or petroleum engineers.

B. Trades/Operations personnel

It was projected that if economic activity in the industry grows as forecast in the next decade the demand for this category of worker would far exceed the demand. Although there appeared to be no intention for the industry to increase its involvement in the apprenticeship programs significantly there were suggestions that companies could begin to offer more "job specific" training which would equip individuals to perform in narrowly defined jobs while not providing a broad "generic" training. It was suggested that increased training efforts would definitely be required in the area of "process control".

C. Supervisory/Managerial Development

While most of those interviewed believed that such training was essential, particularly since most supervisors and managers are selected from the technical ranks, there was concern that current programs were not as effective as they might be. The future may see demands for more in-house training that is closely integrated with the functioning of the sponsoring organization. This could take the form of more organized OJT which concentrates on the development of management skills. Should this occur, it is likely that supervisory and management training will become more closely linked to the "organization development" efforts of companies. At present, most companies have structured their organizations to separate their training and organization development personnel. Integration of these two approaches (i.e. organization development and training) would probably result in a move away from the traditional "management seminar" and would result in more use of "process consultants" working with managers within the line departments.

This development would effect only the larger firms which have specialized human resource development personnel. Smaller companies will continue to contract external sources of training but may be more selective in choosing consultants who will work more closely with the organization, rather than offering a "packaged" program. Smaller petroleum companies may also choose to obtain more of their non-technical training from an industry-sponsored organization such as PITS rather than contracting with private consultants or public educational institutions. This move would give the companies more controls over programs and would insure more homogeneous groups of participants than are found in public programs.

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APPENDIX A

Companies Contacted and Individuals Interviewed

1. Canadian Occidental Petroleum Ltd.
   - R. L. Gouregas, Employee Relations
   - Ian Cumming, Employee Relations

2. Canadian Superior Oil Ltd.
   - Bill Kun, Employee Relations
   - Ray Donais, Exploration

3. Canterra Energy Ltd.
   - Bill Primeau, Human Resources

4. Chevron Standard Limited
   - Reg Harrill, Employee Relations

5. Control Data Corporation
   - G. M. Ramsay

6. Delta Projects Ltd.
   - David Watson, Employee Relations
   - Paul Farkas, Employee Relations
   - Dave Paul, Trainer

7. Dome Petroleum Ltd.
   - Bruce Klatt, Employee Relations
   - Judy Soutiere, Employee Relations
   - Marilyn Clark, Employee Relations
   - George Campbell, Employee Relations
   - Jack Shore, Beaufort Sea Division
   - Ken Robertson, Employee Relations

8. Energy Resources and Conservation Board
   - Ed Brushett, Environment Dept.
   - R. F. Braun, Employee Relations

9. Esso Resources Canada Limited

- David Ellerington, Human Resources
- Fred Bewer, Human Resources
- Joe Richardson, Production Engineering
- Walter Rassmuson, Production Department
- Bill Mitchell, Project Engineering

10. Gulf Canada Resources Inc.
- Ross Baillie, Logistics
- Don McInnis, Human Resources
- Len Rassmussen, Human Resources

11. Hudson's Bay Oil and Gas Company Limited (now Dome)
- Derek Norman, Human Resources
- Wes Omilusik, Human Resources
- Scotty Munn, Caroline Gas Plant
- Walter de Boni, Production
- Don McRae, Information Systems
- Sharon Pegg, Information Systems
- Pete Moretti, Exploration
- Pat Keiran, Geophysical
- Reg Whyte, Land

12. Husky Oil Ltd.
- Peter Arnold, Human Resources

13. Norcen Energy Resources Limited
- David Waymouth, Employee Relations

14. Nova, An Alberta Corporation
- John Sparkes, Human Resources
- Sharon Radu, Human Resources

- Bill Petrick, Human Resources
- Marie Lentsch, Human Resources
- Ron Scrimshaw, Foothills Pipeline

15. Nowsco Well Service Ltd.
    - R. C. Cameron, Technical Training Centre
16. Ocelot Industries Ltd.
    - Marie Moore, Employee Relations

17. Pancanadian Petroleum Limited
    - Jack Kenny, Employee Relations
    - Ken Layton, Employee Relations

18. Petro Canada
    - Al Gates, Human Resources
    - Margaret Rowe, Information Systems

19. Shell Canada Resources Ltd.
    - Paul Chishclm, Manpower Planning and Development
    - Wayne Harvey, Training Co-ordinator
    - Bob Peche, Gas Operations
    - John Hinds, Technical Administration
    - Warren Jarvis, Employee Relations

20. Suncor Inc.
    - Neil Cameron, Humanf Resources

21. The Training Group
    - Don Manual, President

22. Transalta Utilities Corporation
    - Paul Adams, Human Resources
    - Bill Paynter, Safety and Trades Training
    - Jerry Lindsay, Training Centre

23. Turbo Resources Limited
    - Wayne Doyle, Human Resources

24. Union Oil Company of Canada Limited
    - C. L. Herron, Human Resources

Appendix B
Data Collection Forms

TRAINING IN THE PETROLEUM INDUSTRY

INTERVIEW GUIDE

ORGANIZATION

1. Staff
2. Qualifications
3. Reporting Structure
4. Programming Procedures
5. Problems

FINANCE

6. Budgeting Procedures
7. Adequacy of Finances

PROGRAMS

8. Priorities
9. Unmet Needs
10. Effectiveness of Training in General
11. Effectiveness of On-The-Job Training
12. Effectiveness of Formal In-House Courses
13. Effectiveness of Consultant Courses
14. Effectiveness of Individualized Programmed Instruction
15. Effectiveness of P.I.T.S.
16. Effectiveness of S.A.I.T.
17. Effectiveness of University of Calgary
18. Effectiveness of Others
19. Program Inventory (Separate Form)

FUTURE REQUIREMENTS

20. Company Business Plans

21. New Skill Requirements

TRAINING PLANS

22. General
23. Specific Programs (Separate Form)

COMPLETED BY _____ COMPANY _____

TIME PERIOD COVERED _____ TO _____ DIVISION/DEPT. _____

DATE COMPLETED _____

TRAINING IN THE PETROLEUM INDUSTRY

INVENTORY OF CURRENT TRAINING PROGRAMS
(Include recent 12 months period)

PROGRAM TITLE	OFFERED BY		TYPE OF PARTICIPANT		NO. OF PART. SESSION	NO. OF PART. ANNUAL	METHOD OF INSTRUCTION		LENGTH OF PROGRAM	LOCATION	

COMPLETED BY _____ COMPANY _____

DATE COMPLETED _____ DIVISION/DEPT _____

TRAINING IN THE PETROLEUM INDUSTRY

PROJECTION OF FUTURE TRAINING REQUIREMENTS

PROGRAM TITLE	PROBABLE SOURCE		TYPE OF PART.		NO. OF PART. 1ST YEAR	5th YEAR	METHOD OF INSTRUCTION		LENGTH OF PROGRAM	LOCATION	

Appendix C
In-House Supervisory/Management Training Programs

IN-HOUSE SUPERVISORY/MANAGEMENT TRAINING PROGRAMS
(Expressed in Program-Days*)

Program Titles	Canadian Superior	Chevron Standard	Dome	Esso	Gulf	HBOG	Husky	Norcen	Petro Canada	Shell	TOTAL Program-Days	%
General Supervision/ Management												
- Supervision	192	180	2292	330	828	465	120		1050	324	5781	23.0
- Leadership					72						72	.5
- General Management	240		400	1444				200	200	240	2724	10.8
- Interpersonal Relations	64					400			850	30	1344	5.3
- Team Building									300		300	1.2
- Assertive Management				93							93	.4
SUB TOTAL	496	180	2692	1867	900	865	120	200	2400	594	10908	43.4
Specific Management Skills												
- Decision Making							120				120	
- Time Management	72	54	270	7	100				120	40	663	2.6
- Selling					216						216	.9
- Performance Appraisal				290	72	60		210		300	932	3.7
- Kepner-Tregoe				825	836						1661	6.6
- Bus. Negotiations			300	14	96	120				50	580	2.3
- Construction Contracts			50								50	.2
- Effective Meetings									105		105	.4
- Managing Stress									300		300	1.2
- Consulting Skills				125					105		230	.9
- Work Planning				180					240		420	1.7
SUB TOTAL	72	54	620	1441	1320	180	120	210	870	390	5277	21.0
Communication Skills												
- Writing	108	76	240	400			160		300	195	1479	5.9
- Oral Presentations		68		170	144				80	400	862	3.4
- Interviewing		24			64	30			40	80	238	.9
- Public Communications					54						54	.2
- Business Comm.			225	234				120			579	2.3
- Listening									60		60	.2
SUB TOTAL	108	168	465	804	262	30	160	120	480	675	3272	13.0

IN HOUSE SUPERVISORY/MANAGEMENT TRAINING PROGRAMS (CONTINUED)
(Expressed in Program-Days*)

Program Titles	Canadian Superior	Chevron Standard	Dome	Esso	Gulf	HBOG	Husky	Norcen	Petro Canada	Shell	TOTAL Program-Days	%
Finance/Economics - Number Skills - Economic Analysis - Personal Tax Planning	50		 1620	 419	 168						50 587 1620	.2 2.3 6.4
SUB TOTAL	50		1620	419	168						2257	9.0
Orientation - Industry - Company	144	 22 68	50	 136 1344	100	30	240	120	200	 565	1042 1977	4.1 7.9
SUB TOTAL	144	90	50	1480	100	30	240	120	200	565	3019	12.0
Others - Career Development - Secretarial Development		 9	 300				 80		 300	240	240 689	.9 2.7
SUB TOTAL		9	300				80		300	240	929	3.7
TOTAL Program Days No. of Employees	820 662	551 937	5747 4100	6066 3911	2750 1600	1105 1667	720 1300	650 1950	4250 2823	2464 2200	25123 21140	
Average Program Days/ Employee	1.2	.6	1.4	1.6	1.7	.7	.6	.3	1.5	1.1	1.2	

* Program days is the product of the number of participants times the length of the program in days.